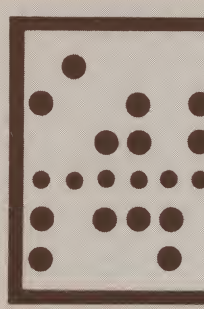
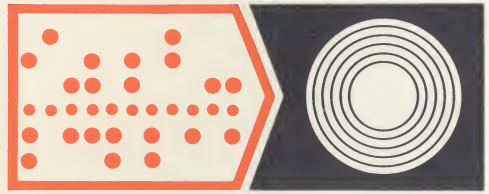
AMPEX

MEDIA CONVERSION SYSTEMS

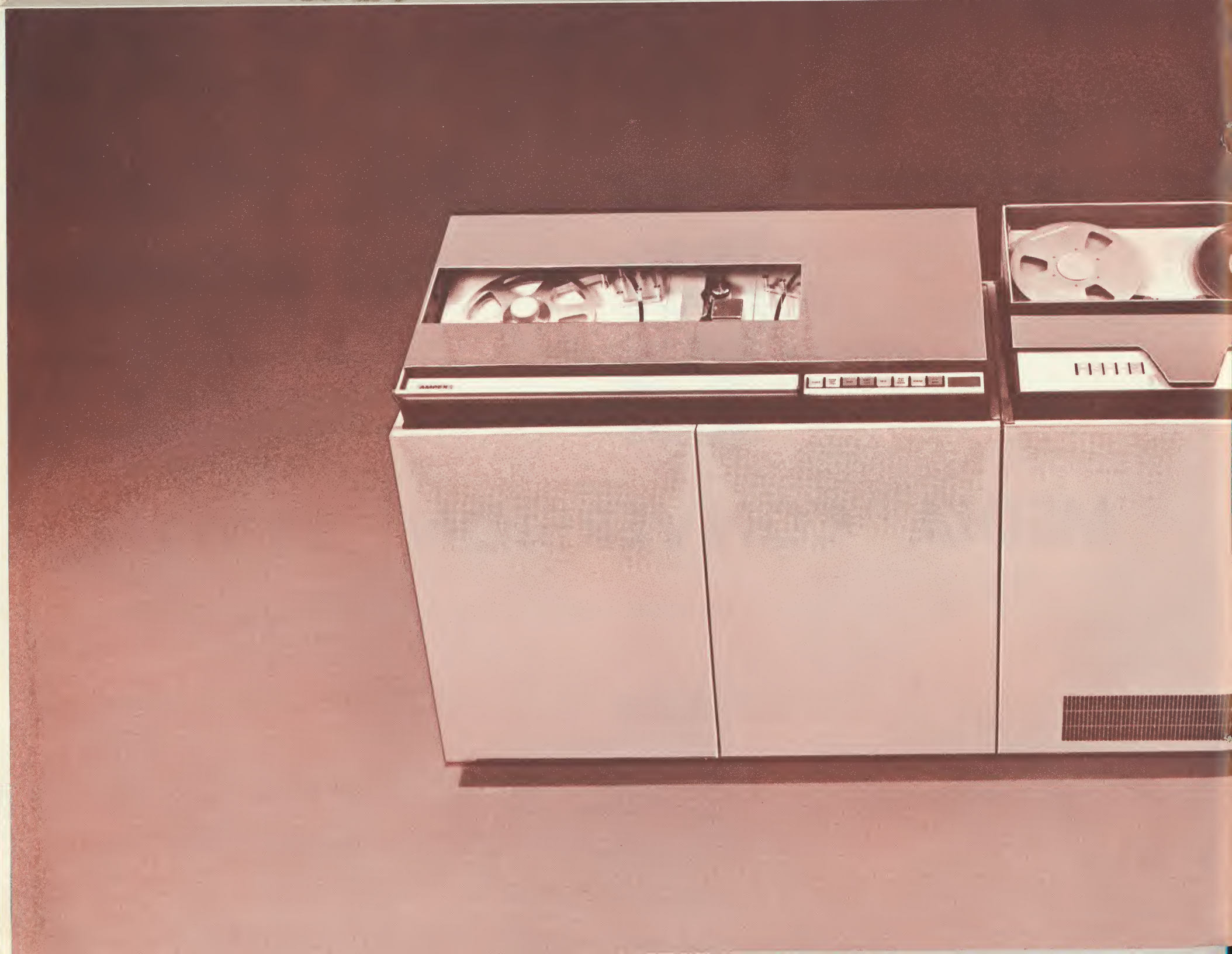


AMPEX

PAPER TAPE / MAG TAPE



MEDIA CONVERSION SYSTEM



This General Information Manual introduces and describes the Ampex Corporation P/T-1000 paper tape-to-magnetic tape Media Conversion System. This valuable equipment reads paper tape data at high speed, translates paper tape characters into equivalent magnetic tape codes, and records the translated information in selectable block lengths on computer-compatible magnetic tape... and the entire operation is *performed completely off-line from the peripheral computer normally required for this function.* The dramatic increase in raw data input rate effected by using magnetic tape as the input medium results in main frame time savings as high as 50%.

an appraisal

Throughout its history, Ampex Corporation has adhered to the philosophy of determining technological gaps and filling them with products and service of highest quality. Ampex audio and video broadcast and recording systems possess a reputation for excellence unsurpassed in the radio and television industry. Ampex video recording systems are also employed in such diverse applications as automated document filing systems and information retrieval devices, aircraft carrier landing systems, and many others. All Ampex systems are supported by highly skilled technicians in our world-wide service organization.

Consistent with this forward-looking philosophy, the Computer Products Division of Ampex has pioneered in the development of critical components from the earliest beginnings of the computer industry. These components range from memory cores and magnetic tape to complete magnetic tape systems, core memories, and I/O controllers. Today, Ampex hardware may be found integrated with computer systems offered by virtually every major domestic and foreign-based EDP manufacturer.

After much careful research and planning, Ampex has departed from its policy of supplying equipment solely to the computer manufacturer and is entering the end-user EDP field. This expansion of the Ampex product line was prompted by the current and ever-increasing EDP-user interest in improving the efficiency of peripheral operations to match the increased speed of the central processor.

The disparity between main frame processing and peripheral equipment speeds has grown enormously in the past decade. During this period, internal processing speeds have increased by two orders of magnitude due to improvements in circuit speeds and by another order of magnitude due to improved logical organization. In the same period, the speeds of punched card handling equipment and paper tape readers have increased by barely a factor of three. Thus, the increased processing speeds cannot be fully utilized because of the slow input/output devices.

The user has responded to this situation by employing magnetic tape as the principal means of transferring raw data to the central data processor. Smaller satellite computers which perform preliminary editing, data checking, etc., on raw data are thus given the additional task of converting data from other media to magnetic tape. This is hardly an optimum solution.

In the first place, the problem of speed differential is not really solved, but only transferred to another device. The data handling rate of the satellite processor main frame, while not as fast as that of the larger central processor, is still vastly greater than the data input rate from punched card or paper tape readers. Secondly, these satellite processors are expensive in terms of both direct lease or purchase costs, and indirect costs such as floor space, programming support, and operator personnel. These expenses become even more significant if the media conversion load on the satellite device is so great that second-shift scheduling of equipment and operator personnel is required.

The Ampex solution is to provide inexpensive off-line operational equipment directed toward maximizing effectiveness of the costly on-line processing equipment employed in the modern EDP installation. This off-line equipment will perform the time-consuming but basically simple media conversion operations independently of either the central data processor or its attendant satellites, thus enabling those equipments to perform the more difficult tasks for which they were conceived.

The initial offering in this program was the eminently successful line of punched card-to-magnetic tape Media Conversion Systems, which are described in a previously issued document. The second product of this continuing effort is the P/T-1000 paper tape-to-magnetic tape Media Conversion System described herein.

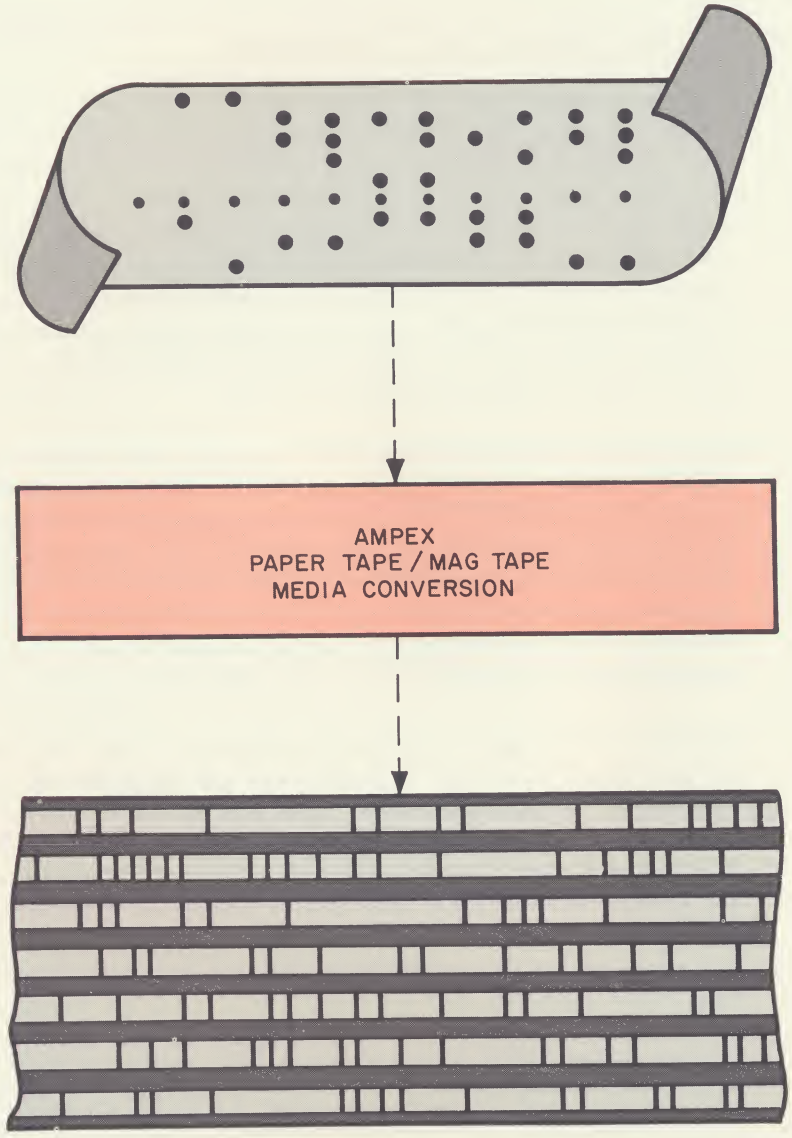
description and features

the basic system

The Ampex P/T-1000 Media Conversion System (MCS) offers a new dimension in paper tape processing efficiency. Using the P/T-1000, raw data on punched paper tape is transferred to magnetic tape, and the recorded magnetic tape then becomes the main frame input medium for raw data. The system operates off-line from the computer — as a complete end product in itself.

Designed for trouble-free economical operation with virtually continuous usage, a single P/T-1000 can handle all paper tape conversion for a major installation, yet in many cases its cost has been justified when used only two hours per day. The system accepts, 5, 6, 7, or 8-level paper tape in virtually any code, and produces recorded magnetic tape in the 7-channel format compatible with the IBM 729/7330 tape transports, or in the new 9-channel format for compatibility with the ASCII code or the IBM 2400 machine.

Physically, each system comprises two cabinets: a Paper Tape Unit and a Magnetic Tape Unit. The Paper Tape Unit contains the paper tape reader, 4096-character core buffer, and system control logic. The Magnetic Tape Unit is a standard Ampex tape transport with data electronics. In operation, paper tape is read at 1000-characters per second, and the paper tape data is transferred character-by-character to the system control logic. There the paper tape characters are checked for validity, translated into equivalent magnetic tape coded characters, and appended with a parity bit. Translated characters are then stored in the sequentially addressed core memory for accumulation of a data block. When the selected-length data block has been read, the paper tape reader is stopped, the Magnetic Tape Unit is enabled, and the buffer contents are written onto magnetic tape. Data being written onto magnetic tape is verified by data rate and read-after-write checks. Should an error be detected



COMPLETE END-PRODUCT SYSTEM

in the write operation, indicating probable bad tape surface, the system automatically (i.e., without operator intervention) erases the entire bad block and rewrites the block correctly "down tape" of the bad area.

The character validation and elaborate write checking/correcting schemes built into the system further enhance satellite and central processor throughput rates in that an error-free tape is assured. This significantly decreases costly operator intervention or execution of error recovery routines so often encountered when media conversion is performed on-line.

The recorded magnetic tape is fully computer compatible. Standard-length interblock gaps and longitudinal parity check (LPC) characters are automatically recorded after each block; standard cyclic redundancy check (CRC) characters are also recorded if required for IBM 2400 compatibility. Integral files may be separated by file mark characters and interfile gaps consistent with the required tape format. Even header and trailer labels may be recorded, either as short records or integral files separate from the main data file, thus relieving the main frame of necessity for computing and entering this information during input processing.

While satisfying an immediate, pressing need in virtually any paper-tape oriented data processing installation, the P/T-1000 MCS equipment is also protected against obsolescence. The paper tape reader, core memory, and tape transport all offer field-proven dependability, yet each is among the most modern equipment in the computer industry. In addition, systems are being delivered with both second and third generation computer compatibility. For those who require the 7-channel format now, but may be changing to a 9-channel format in the future, the system is provided with on-site modification capability.

Inherent versatility is also provided by the means employed for code conversion. A simple code conversion table, permanently stored in the core buffer, forms the basis for translation from paper tape to magnetic tape codes and for recognition of special control codes

the paper tape reader satisfies the requirement for high speed operation, yet it is capable of stopping between characters to permit magnetic tape recording of an accumulated data block. Maximum data reliability is assured through use of a photodiode read scheme.

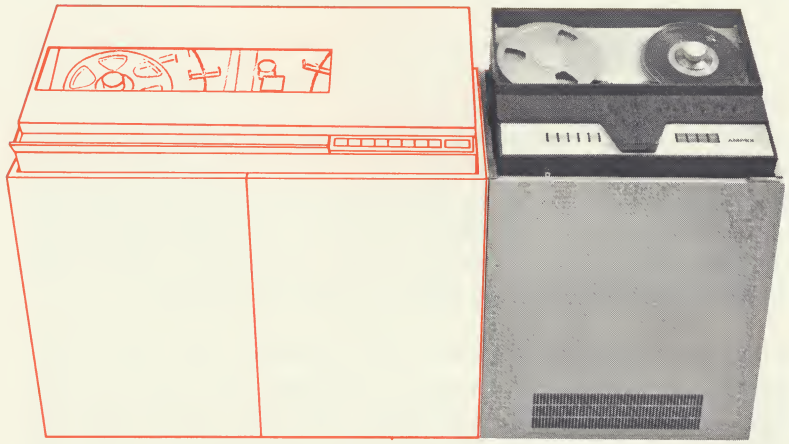
The Paper Tape Unit also contains a standard Ampex Model RF core memory with capacity of 4096 ten-bit characters, and a control logic section. Both the RF memory and control logic feature integrated electronics for the high speed and excellent reliability inherent in such construction.

magnetic tape unit

The Magnetic Tape Unit employed in the MCS is the Ampex model TM-7211, one of a new generation of medium to high-speed tape transports which feature a revolutionary electronically controlled single capstan drive. This new concept allows up to an 80% reduction in moving parts, resulting in far greater mechanical reliability relative to any transport previously available.

Tape life and attendant data reliability are also greatly increased. The only surfaces in sliding contact with the tape oxide are the read/write heads and tape cleaner, and accurate control of tape tension is maintained throughout the tape path. In addition, tape is not removed from vacuum chambers during rewind, thus assuring constant controlled tension for even tape pack.

Data is recorded on standard ½-inch magnetic tape in 7-track IBM 729/7330 format, 9-track ASCII, or 9-track IBM 2400, and packing density is selectable at 200/556 or 556/800 cpi. A 7-track system may be modified for 9-track recording by merely changing the read/write head and adding the additional electronics in pre-wired card slots — a simple 2-hour procedure. Such adaptability is an absolute requisite in today's rapidly changing computer industry.



MAGNETIC TAPE UNIT

operational characteristics

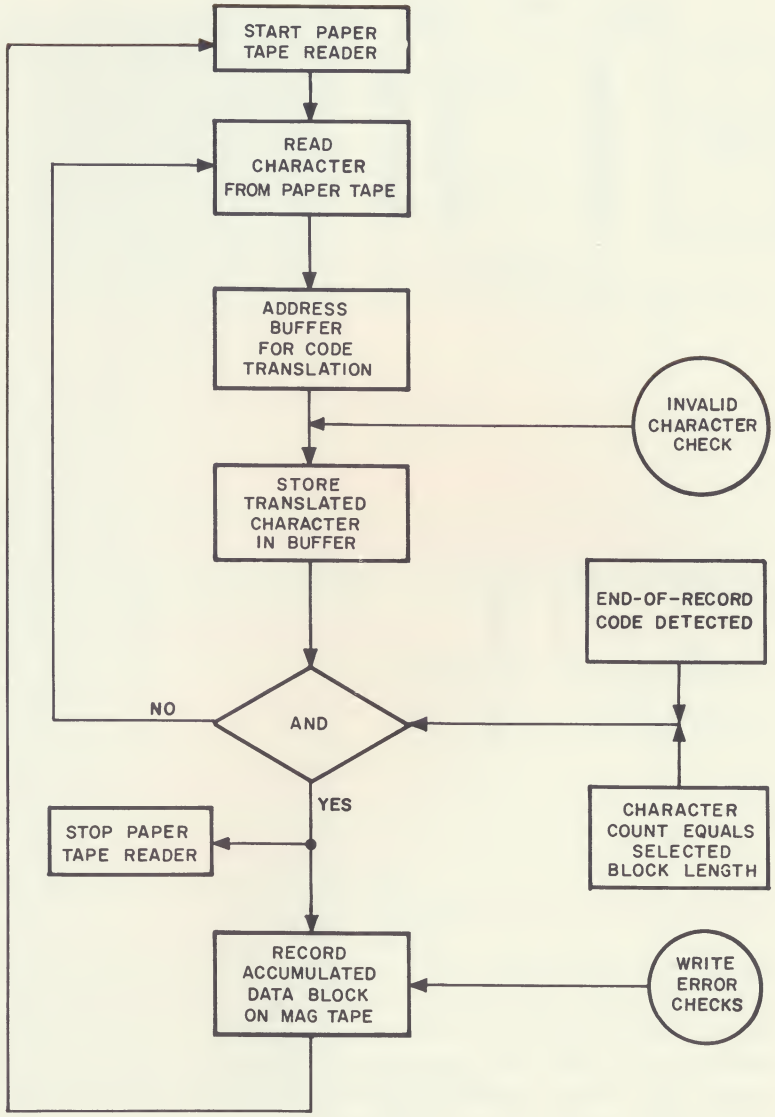
code translation

Translation from paper tape characters to magnetic tape characters or system control codes is accomplished by a dynamic table lookup routine, much the same as the method used when media conversion is performed on a computer. This method offers versatility unequaled among off-line systems. A translation table is written into the core buffer from a special customer-prepared tape strip, and protected by a key-locked switch during subsequent conversion operations. Because the operator "programs" the system for code conversion, a character set of any size may be used, and code conversion is readily modified for files using different character sets by simply loading a new table tape strip.

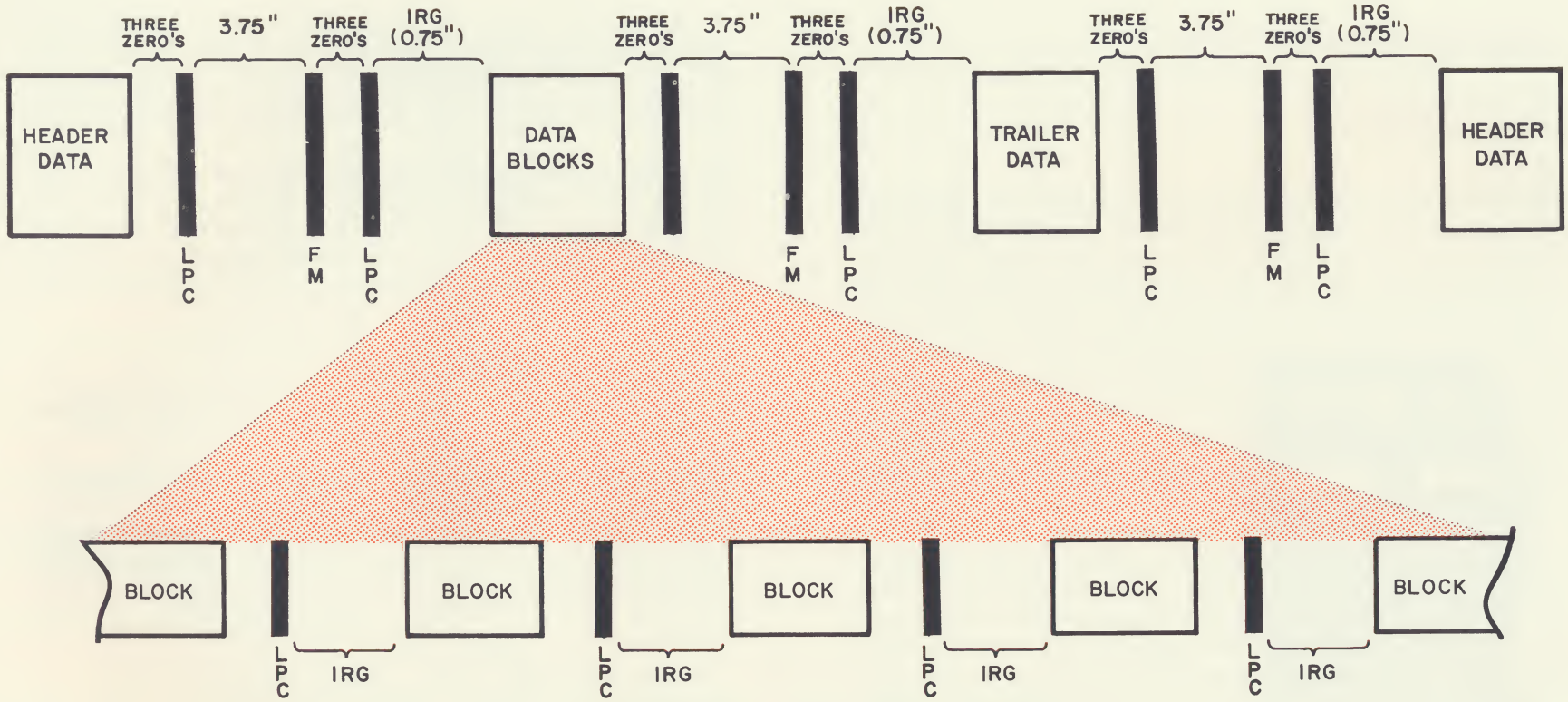
The code conversion table lookup is a simple, virtually fool-proof operational sequence. Each character read from paper tape is used to address a particular core buffer storage location. Loaded into that address during the table load operation is the magnetic tape character or system control corresponding to the paper tape character. During the subsequent read-restore buffer cycle, the magnetic tape character or control code is sampled and verified to be part of the programmed character set, then either stored as part of the current block or used to initiate the identified control function.

block length control

Block length is variable in single-character increments up to a 4000-character maximum and may be controlled by two different methods, used either singly or in conjunction with each other. If fixed length blocks are required, the desired block length is set on thumbwheel switches located on the system control panel. Block length may also be controlled by punching end-of-block codes at the appropriate points on paper tape, thus providing for variable length blocking.



SEQUENTIAL OPERATIONS



729/7330 MAGNETIC TAPE FORMAT

header/trailer recording

Header and trailer labels, short records containing information about a main data file, are normally computed and recorded before and after the main data file during on-line media conversion. When using the P/T-1000, this data may be recorded from short strips of paper tape, thereby effecting a further increase in speed of input processing. Format of the header/trailer labels is entirely at user option, and they may be either recorded as part of the main data file or separated from the data file by file mark characters.

magnetic tape formats

The accurately formatted magnetic tape produced by the P/T-1000 system eliminates need for costly intermediate processing before inputting the raw data to main frame. In the standard system, magnetic tape is produced in a 7-track format compatible with the IBM 729/7330 tape transports (note illustrated track format). Data blocking, longitudinal parity check (LPC) characters, and interblock (IBG) gaps are produced automatically as paper tape data is read. File mark (FM) characters (octal 17) and associated interfile gaps are produced where required by operating a pushbutton switch on the system control panel.

Options may be incorporated in the system either at time of order or after the system is installed, to modify the magnetic tape format for compatibility with either the 9-track ASCII code or the IBM 2400 series tape transports. Just as with the 7-track systems, all gaps, control characters, and redundancy check characters (including CRC) are generated as required by the recording format.

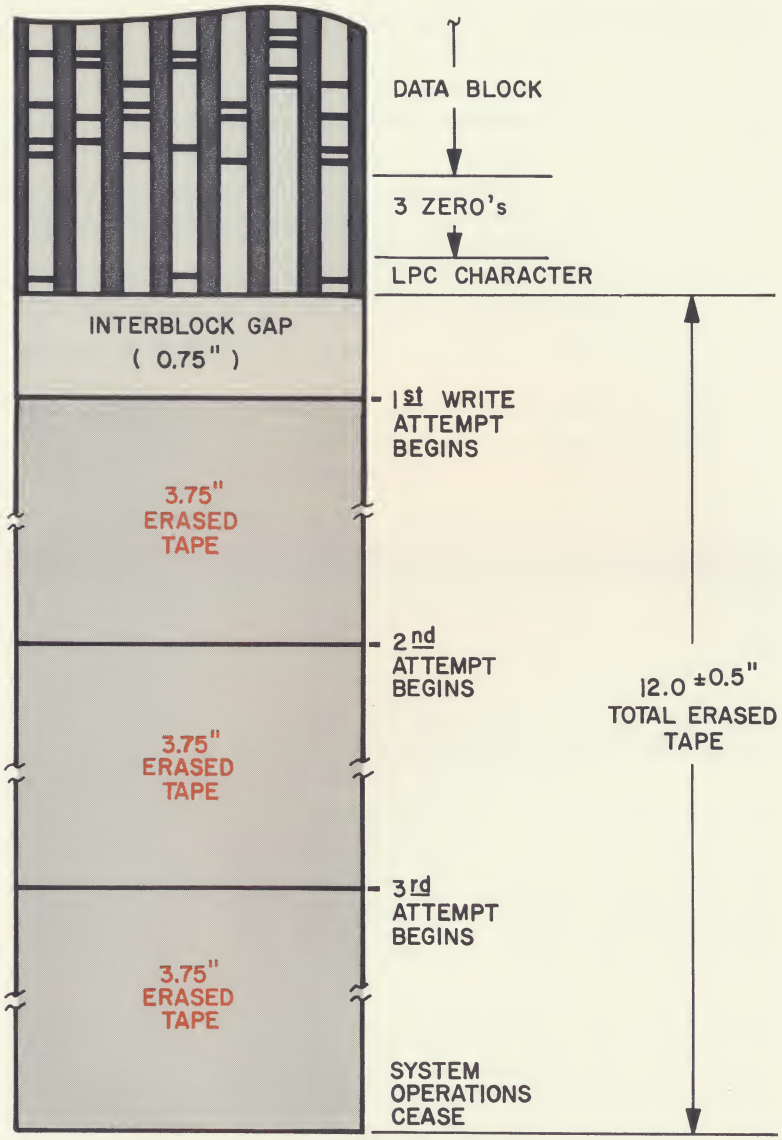
error check schemes

System operations are sequenced, controlled, and monitored to absolutely prevent recording invalid or unreadable data on magnetic tape. As characters read from paper tape are translated, a validity check is made to determine that the character is not incorrectly punched or read in error. Translated characters are then stored in a core buffer, and transfer to magnetic tape does not begin until a complete verified block of data has been accumulated. Elaborate checks are made during the magnetic tape write operation, and any detected error is automatically corrected. It should be noted that no loss of data is experienced in the event of a write error since the data block remains stored in the core memory until the write operation is complete.

invalid character check

The magnetic tape codes loaded into the core buffer as part of the translation table are appended with a special sign for identification purposes. During translation from paper tape code to magnetic tape code, each paper tape character is verified to be part of the programmed character set by checking for the table identifier on the corresponding magnetic tape code.

If the identifier is missing, indicating the paper tape character was either mispunched or read incorrectly, system operation continues; however, a special user-specified character is inserted in place of the invalid character and as an extra character at the end of the block (other system responses are available on an optional basis).



3-TIME SKIP WRITE

write error checks

As the translated block is being written on magnetic tape, three separate checks are made to ensure that the tape-recorded data is error-free.

a. The echo check determines that data write signals are actually being generated in the write head.
b. The read-after-write check performs a parity check on the data characters written on the track. Read signals for this check are obtained from a read head mounted behind the write head for each track.
c. The rate check determines that the frequency of read-after-write signals is correct for the established packing density.

The most common cause of a write error is a bad spot on the tape. When a write error is detected, a 3-time skip-write procedure is initiated. The tape automatically reverses and rewinds to the end of the last interblock gap (i.e., the beginning of the block in which the error occurred). The tape then moves forward again and 3.75 inches of tape is erased. At the end of the erased area, an attempt is made to rewrite the data block in which the error occurred. Should an error be detected during the second attempt, the same procedure is repeated, and a third rewrite is attempted. Failure of the third attempt stops the system after the bad block is erased. If desired, the 3-time skip-write procedure may be repeated indefinitely under manual control.

contractual considerations

The P/T-1000 system can be obtained through outright purchase or through lease or lease/purchase agreements. Lease agreements include as part of the lease costs a PM and repair service contract. A service contract of the same type is available at nominal cost for purchased equipment.

Maintenance for leased equipment or incident to a service contract is performed by members of the Ampex field service staff. Field service technicians highly trained in maintenance of the media conversion equipment are based in every Ampex sales office (note list on back cover). The strategic location of these offices ensure prompt service in the event of an equivalent malfunction.

Acceptance testing is carried out in two phases. Approximately 30 days prior to shipment, the customer is invited to forward several typical reels of paper tape from his installation, and a paper tape/magnetic tape character code cross reference table. Ampex will convert the paper tape to magnetic tape on a P/T-1000 system, and return the recorded tape to the customer for normal processing on his computer. This procedure will point out any program or procedural changes which are necessary to achieve optimum utilization of the media conversion equipment.

The second phase of the acceptance test normally entails a reliability and performance test which is performed as part of normal processing after the system is installed at the customer facility.

QUESTIONS ABOUT THE PAPER TAPE/MAG TAPE MEDIA CONVERSION SYSTEM

The following pages of this General Information Manual are devoted to answering detailed questions about the P/T-1000 system. Those answered include questions of interest to systems analysts and programmers in evaluating the system for their particular EDP installation, questions concerning site preparation, power requirements, and service conditions, and questions relating to lease agreements, service contracts, and other contractural considerations of interest to the customer's controller, and purchasing and contract negotiation personnel.

Can your P/T-1000 MCS equipment completely replace the satellite computer we presently use for paper tape to magnetic tape conversion?

The Ampex off-line media conversion systems are not, and have never been intended as, a replacement for any computer. In fact, their sole function is to permit more efficient utilization of computers by performing those tasks for which a computer is not really required.

An on-line paper tape to magnetic tape run typically includes the following operations:

(1) Character translation from paper tape codes to magnetic tape codes
(2) Stripping of paper tape control characters not required in the magnetic tape record
(3) Fixed or variable length blocking of magnetic tape recorded data
(4) Detection and treatment of invalid source codes
(5) Detection and treatment of magnetic tape write errors
(6) Logging of magnetic tape sentinals (header and trailer data and file mark characters)
(7) Field reasonableness checks
(8) Check sum validation
(9) Field expanding or compacting
(10) Partial sort

The first six of these are uniform mechanical operations which can be accurately performed by the MCS equipment off-line from the computer. The last four are variable functions which involve dynamic editing and are thus more efficiently performed in main frame under program control. Because it performs only the fixed phases of the total conversion task, the P/T-1000 system remains basically uncomplicated, with attendant high reliability and ease of maintenance, yet its use does not sacrifice program flexibility.

Your system is certainly valuable and you should sell many to installations using "second generation" computers. However, our new computer is a "third generation" model which, when we receive the proper software, will let us perform I/O operations simultaneously with internal processing. Thus, the main frame is not really hampered by the slow speed of the paper tape reader. Right?

Wrong. This multiprocessing capability offered in certain third gen-

eration computers will certainly be a time saver on computers used in scientific applications where long, involved mathematical computations are common. However, in business data processing — far and away the most important job of most computers — the time required for internal processing is relatively insignificant. In such cases, the program is I/O limited and the multiprocessing capability helps little, if at all; the overall processing speed is determined almost totally by the I/O data rate. Thus, in the majority of applications, the P/T-1000 system is just as valuable for third generation computer systems as it is for those considered second generation.

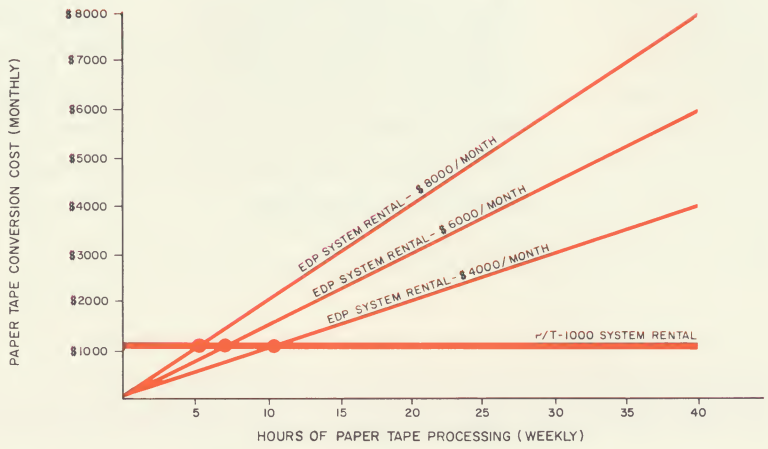
We currently perform paper tape to magnetic tape conversion on a satellite computer, using about 40 hours of main-frame time each month. Can you illustrate what we might save using the P/T-1000 system for this task?

Using only paper tape volume, a really accurate projection of savings is impossible. However, it is possible to obtain "ball park" figures using the illustrated charts.

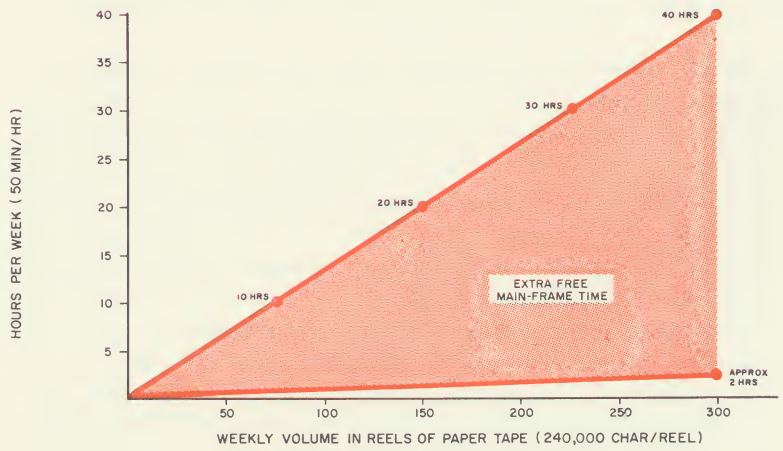
One of the charts illustrates paper tape/magnetic tape media conversion costs for three different computer systems. This chart is based on weekly processing volume in hours, and associated processing costs are shown on a "per-month" basis. For comparison, the approximate monthly lease charge for a P/T-1000 system is also charted. The "break-even point", against considering only processing volume, is the intersection of the line representing P/T-1000 lease cost with those representing computer system lease costs.

The second chart compares the main frame time required to input raw data from paper tape with the time required to input the same volume of data from magnetic tape. As indicated by the shaded area, the difference between the data rates of these two media promises really significant savings in main-frame time.

SIGNIFICANT, DEMONSTRABLE SAVINGS . . .



EITHER IN HARD MONEY . . .



OR IN COMPUTER TIME

We recently installed our first computer, a small general business system, to process orders received via TTY from our outlying branches. Even though this involves a great deal of paper tape processing, your system is not economically feasible for us because we have plenty of computer time available.

You're in good shape at the moment, but how long will your top management people allow the economies offered by electronic data processing to be felt in only one area? Virtually every computer user experiences rapid growth of EDP tasks in the period following installation of his first computer. You would do well to begin planning the orderly acquisition of new equipment now, in advance of the needs sure to be experienced in the future.

How can we justify using your media conversion system when we can use our satellite computer on second shift for only 10% of the basic lease rate?

The P/T-1000 system will in most cases handle your paper tape conversion tasks on a single-shift basis, and it can be operated by a single, relatively low-salaried person (i.e., key-punch or tab operator).

Because operating a computer typically requires two higher-salaried computer operators, costs of hiring those additional people, in addition to the second-shift lease rate, far outweigh the costs of operating the media conversion system on a single shift.

I realize the P/T-1000 system paper tape reader operates at 1000 characters per second. Is this the actual throughput rate from paper tape to magnetic tape?

Not quite. The paper tape reader stops during the time an accumulated data block is written on magnetic tape. For this reason, actual throughput is somewhat less than paper tape reader speed because of the tape run time. Assuming tape packing density of 800 cpi, the following figures indicate system throughput in characters per second for various magnetic tape block lengths.

(1) BLOCK LENGTH — 100 characters

Paper tape read	= 100 ms
Mag tape read	= 18 ms
Total block	= 118 ms

$$\text{throughput (char/sec)} = \frac{1000}{118} \times 100$$

$$= 847 \text{ char/sec}$$

(2) BLOCK LENGTH — 1000 characters

Paper tape read	= 1000 ms
Mag tape write	= 50 ms
Total block	1050 ms

$$\text{throughput (char/sec)} = \frac{1000}{1050} \times 1000$$

$$= 952 \text{ char/sec}$$

(3) BLOCK LENGTH — 4000 characters

Paper tape read	= 4000 ms
Mag tape write	= 155 ms
Total block	4155 ms

$$\text{throughput (char/sec)} = \frac{1000}{4155} \times 4000$$

$$= 960 \text{ char/sec}$$

Is the paper tape reader equipped to handle center-feed tape reels?

No. The tape handler feeds paper tape only from the outside of the reel. Center feeding at 1000 characters per second is not desirable because of excessive tape damage.

What is the paper tape rewind speed?

Paper tape rewind can be accomplished at 100 inches per second. However, because of its adverse effect on throughput, Ampex recommends that rewinding of converted paper tape reels be performed on a separate spooler.

Suppose the paper tape runs out in the middle of a block. Must that partial block be recorded on magnetic tape before starting the next reel of paper tape?

No, recording a short block is unnecessary. A fresh reel of paper tape may be loaded and system operation restarted from the beginning of that reel. The first data on the new reel will complete the unfinished block.

If I run out of paper tape in the middle of a block and have no further paper tape to be processed immediately, is it possible to "pad out" the remainder of the block with a special pad character?

Yes, partial records may be padded by running a paper tape strip, pre-punched with the desired character, through the tape reader. This strip need not be of a specific length so long as the number of characters is greater than that required to complete the block and no greater than the block length set on the thumbwheel switches.

You have said I can change character sets by "simply loading a new translation table." Just how simple is this process?

Just as simple as the statement implies. A key-locked switch is used to clear the current table from the core buffer, and establish conditions for loading the new table. A tape strip punched with the new translation information is then passed through the paper tape reader in the normal manner. This automatically loads the new table. Returning the key-locked switch to "Data Run" protects the table during subsequent conversion operations.

Loading the table certainly seems simple enough. Is the table tape strip difficult to prepare?

A table tape strip is no more difficult to prepare than a normal data tape. Of course, great care must be exercised in its preparation to assure accurate code translation.

The translation information is punched in character pairs on standard 8-level paper tape. The first character of each pair is the magnetic

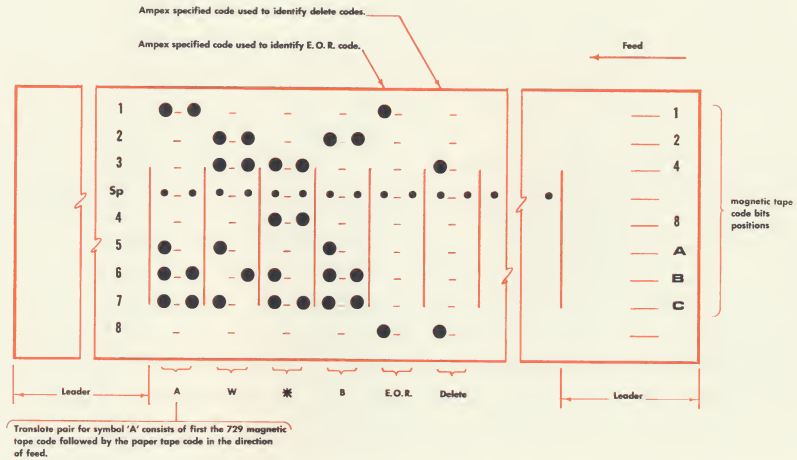
tape coded character; the second is the equivalent paper tape character. Magnetic tape characters are entered with parity assigned. Odd or even parity may be used (even parity is used in the illustrated example).

The end-of-record (EOR) character on paper tape is user-specified and is therefore entered in the translation table tape paired with the Ampex code (1-8 punch) for this control character. This character is used only to implement the end-of-record function; it is automatically deleted from the magnetic tape record. Any other paper tape characters not required in the magnetic tape record (i.e., carriage return) may be programmed for deletion by pairing them with the Ampex delete code (3-8 punch) in the translation table.

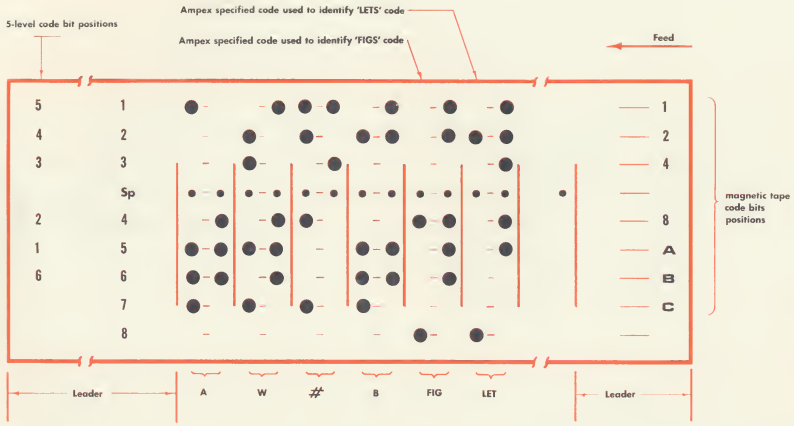
Does the translation table tape for 5-level tape require special preparation?

Yes. In order to record a full 64-character set on magnetic tape, code translation must provide for recognizing Figures and Letters shift characters. In addition, all characters designated Letters characters must contain an extra punch in level 6 for identification purposes.

During a data run for 5-level tape, Figures characters address the memory in the normal manner for code translation. However, Letters characters, (i.e., those which follow a Letters shift) are internally appended with an extra ONE bit for addressing purposes; this allows a Letters character to address a memory location different from an otherwise identical Figures character. The extra level 6 punch required for table load of Letters characters is used to store the magnetic tape codes equivalent to those characters in the proper memory locations.



8-LEVEL PAPER TAPE/IBM 729 MAG TAPE



5-LEVEL PAPER TAPE/IBM 729 MAG TAPE

Can you modify the standard system to use European power sources?

Yes, an option may be incorporated to enable the P/T-1000 system to operate from 230-vac, 50-cps, single phase power.

Are any special cooling requirements required for the P/T-1000 system?

The systems are designed for operation without special cooling provisions in the environment normally found in a modern computer installation. Service conditions are as follows:

Temperature	
Operating	60°F minimum
	90°F maximum
Non-operating	—30°F minimum
	150°F maximum
Humidity	
Operating	40% minimum
	70% maximum
Non-operating	90% maximum

What are the standard system power requirements?

Standard power requirement for the P/T-1000 system is:
117-vac ± 10%, 60-cps ± 5%, single phase
21 amps total
Broad flexibility is provided for in supplying system power. The total current requirement may be supplied from a single source capable of carrying the entire load, or from two separate single-phase lines.

Must I supply any system cabling?

All power and signal cables necessary to interconnect the system consoles are included. However, because of the differences among local regulations governing power wiring, variations in cable length requirements, and the flexibility in power wiring configuration, the customer must supply power cables from the source to the system.

Is the cabling configuration and length such as to allow for under-the-floor wiring?

The interconnecting and system power wiring exists under a kick plate so that cables may be routed either under the floor or on the floor surface. Cables provided are of sufficient length to allow separation of the cabinets up to four feet.

What are the outer dimensions and weight of the system?

The P/T-1000 is contained in two compatibly styled cabinets, designated Paper Tape Unit and Magnetic Tape Unit. Detailed physical characteristics of each cabinet are given below.

Paper Tape Unit	
Width	45 in.
Depth	22 in.
Height	44 in.
Weight	525 lbs.
Magnetic Tape Unit	
Width	28 in.
Depth	22 in.
Height	44 in.
Weight	450 lbs.

We plan on leasing a P/T-1000 system. Will there be an extra charge for maintenance and repair?

Maintenance and repair are included in the basic lease agreement. Preventive maintenance is performed by an Ampex service technician on periodic scheduled visits. Should an equipment malfunction occur during the working day, a phone call to the local sales/service office will bring a service technician within hours.

On leased equipment or equipment covered by a service contract, will my operators be required to perform any preventive maintenance?

The periodic visits by the Ampex technician are scheduled to satisfy most maintenance requirements. However, certain "housekeeping" tasks must be performed. These include dusting, cleaning the paper tape read station, and cleaning the magnetic tape recording head —simple tasks consuming no more than five minutes per 8-hour shift.

Should a malfunction occur on leased equipment during an evening shift or on a weekend, must I wait until normal daytime working hours to have the equipment repaired?

No. A service technician is available during periods other than normal working hours to perform unscheduled maintenance. However, an extra charge is made for this service.

How many hours per month may I use the systems under the lease agreement?

The standard lease agreement is written on the basis of 176 hours of operation per month. This time is indicated on a running time meter mounted on a control panel inside the cabinet doors, and includes all time in which the system is energized for purposes other than maintenance.

Suppose I lease a P/T-1000 system, then decide to purchase the same system at a later date. Will any lease payments be applicable toward the purchase price?

Yes. In fact, our whole lease policy tends to encourage eventual purchase. The standard lease agreement provides for 85% of lease payments to be applied towards purchase during the first six months, 75% during the remainder of the first year, 70% during the second year, 60% the third year, etc., up to a maximum of 80% of the purchase price.

When can I expect delivery?

The P/T-1000 is now in volume production, making possible delivery of a standard system within 90 days ARO.

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